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Researchers make cloud sandwiches

By PAUL C. CURTIS
Staff Writer

BARKING SANDS — Tests designed to help scientists learn the role of clouds in global warming are planned at the U.S. Navy's Pacific Missile Range Facility later this month.

The mission includes check flights, a blessing of a new high-altitude unmanned plane and flights to actually gather data about every day or two from April 19 to May 19, weather permitting.

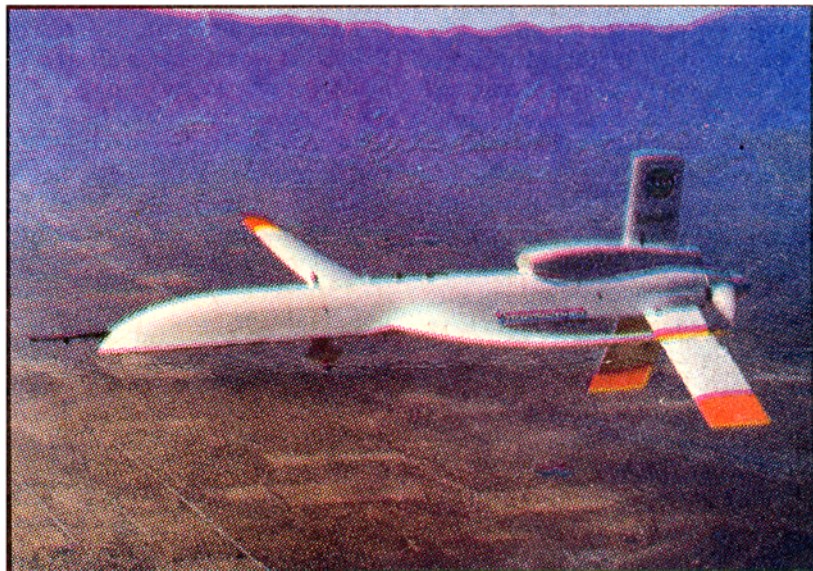
"There's a problem with some of the computer models that have been used to try to understand climate change, and they don't adequately take into account the role of clouds," said Nancy Garcia, spokesperson for Sandia National Laboratories' Livermore, Calif. public affairs office.

"Water vapor is the major greenhouse gas. So it's important to take these measurements and see what's more dominant: the cooling effect of clouds, or the fact that they may be trapping in some heat," Garcia said.

The testing involves what's called a cloud sandwich formation, with an unmanned plane flying above cirrus clouds and a piloted plane flying under the clouds.

Having two aircraft in that formation, both making simultaneous measurements of radiation energy, will provide scientists with much information, said Sandia's Will Bolton.

The data gathered will allow



ALTUS II, a high-altitude unmanned plane, will take part in research on global warming.
(photo courtesy of General Atomics)

scientists to know how much energy from the sun is reaching the top of the cloud, and how much is being reflected off the top of the clouds, said Bolton, deputy technical director for the Atmospheric Radiation Monitoring-Unmanned Aerial Vehicle (ARM-UAV) program.

Measurements from the bottom aircraft will tell researchers the amount of energy passing through the cloud, and the amount of energy reflected from the surface back to the bottom of the cloud.

"By differencing those measurements, you get a sense of how much is absorbed in the cloud, as well as how much is reflected from the top and bottom of the cloud," he said.

"So those kind of measurements are very useful in helping understand the role the clouds play in both warming and cooling, certainly, in the atmosphere below the clouds."

The PMRF testing has two major

purposes: testing the technology for the first time over the ocean with the new Altus II unmanned plane, and testing involving tropical cirrus clouds, Bolton said.

There are tests planned for both clear and cloudy days.

Don't expect the answer to the Earth's global warming problems from these tests, he cautions.

"There isn't a short, quick answer about what we hope to gain from this series of flights," Bolton continued.

"We're both developing tools and acquiring data which will become part of the storehouse of knowledge that will help understand the global climate change phenomenon in the longer term.

"So in a way it's kind of unsatisfying because you'd like to be able to say 'We're going to go out and take this measurement and then we'll have the answer to this problem.' And it's not quite that

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Cloud study

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simple," Bolton said.

The project is expected to bring about 35 folks to the island, including representatives of the builder of the unmanned plane, Sandia, and scientists from major universities and other places who are bringing the test equipment.

The PMRF portion of the project has a budget somewhere between \$1.5 million and \$2 million, Bolton estimates.

General Atomics Aeronautical Systems, Inc. built the Altus II, the unmanned plane, for the National Aeronautics and Space Administration (NASA) Environmental Research Aircraft and Sensor Technology program (ERAST).

Funding for the PMRF tests comes from ERAST and ARM-UAV.

The Altus II has been tested at Edwards Air Force Base in California, and El Mirage, Calif., to ensure it can reach altitudes necessary to do the cloud testing, Garcia said.

Sandia is one of the U.S. Department of Energy's national laboratories, and ARM-UAV is the DOE's program.

The ARM-UAV study has been going on since 1992.

The ARM program focuses on measuring radiation (solar energy, thermal energy, visible and ultraviolet light) in the earth's atmosphere, primarily using ground-based instruments, Bolton noted.

An Oklahoma site has been gathering data for years. The ARM-UAV program data will augment the ground-based instruments

by gathering information from the atmosphere from aircraft.

The cloud sandwich testing has also been done in Oklahoma, and if the PMRF tests are successful, the testing method will be used in various parts of the warm tropical Pacific Ocean, coordinated with ground-based instruments on other islands.